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vey of Canada. The considerations which should guide the final selection of a uniform system, must be—first, availability for practical use; and second, the extent to which any given system has already been perpetuated in existing cartography.

The important condition first mentioned obviously includes the presentation of a sufficiently large number of sufficiently distinct colors or patterns, to include all the minor geological divisions which have been, or are to be, discovered. From this standpoint the plans sent in by the committees to the Congress of Bologna are very defective. Their authors apparently forgot that Europe constitutes but a small part of the world, and that the system to be adopted must represent America, Asia, Africa, and Australia. The United States system, devised by Powell, is much better in this respect. A combination of this with the European scheme would do very well for the continents where they originated, but we suspect that even this combination would not be sufficient for the entire world. A larger list of colors and pattern variations even than that offered by Powell, will be required when the geology of the world comes to be known. In using them, also, care must be observed to allow vacancies for the undiscovered formations, and only paleontologists will be able to furnish indications as to where these are likely to be intercalated.

— In an editorial of May, 1881, we referred to the desirability of a meeting of the British Association for the Advancement of Science, in America in 1883. The proposition to meet here in that year was not adopted by the association, but it has determined to meet in Montreal in 1884. The Allan line of steamers has offered extensive facilities to the visiting members, and the hospitalities of Montreal have been freely proffered. A large number of members have signified their intention of availing themselves of this opportunity of visiting our continent.

It is desirable that the meeting of the American Association, held the same year, shall be fixed at such a time as will enable the visitors to attend it also. The locality should not be remote from Montreal, and should be of easy access. An invitation will probably be sent from Philadelphia, the birth-place of the American Association. Should this be accepted our British friends may expect a warm and appreciative welcome. The Academy of Natural Sciences, the American Philosophical Society, and the Franklin Institute have appointed committees to take the matter in charge.

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RECENT LITERATURE.

WHITE'S NON-MARINE FOSSIL MOLLUSCA OF NORTH AMERICA.<sup>1</sup>  
—In this work the palæontological student has for the first time

<sup>1</sup> *Department of the Interior, U. S. Geological Survey.* J. W. Powell, Director. A review of the non-marine fossil Mollusca of North America. By CHARLES A. WHITE. Extract from the annual report of the director of the U. S. Geological Survey, 1881–82, Washington, 1883. Large 8vo, pp. 144, 32 plates.

a connected view of a most interesting assemblage of fresh-water and brackish-water mollusks, belonging for the most part to a transition period of great scientific interest, that between and connecting the Cretaceous and Tertiary periods, *i. e.*, the Laramie. Dr. White first takes up each family in systematic order and traces the history of its occurrence so far as it has been learned, from the earliest known appearance of any of its species within the present limits of North America until the present time, with a general discussion of certain questions suggested by the facts stated.

The author claims that the Laramie group is a transitional one between the Cretaceous and Tertiary. "Neither the Laramie group nor any true geological equivalent of it is at present known anywhere except in Western North America. It there occupies or is found at various localities within a large region, the present known limits of which may be roughly stated as extending from Northern New Mexico on the south to the British possessions on the north, and from the vicinity of the Great Salt Lake on the west to a present known distance out upon the Great Plains of more than two hundred miles from the eastern base of the Rocky mountains. It has been traced within the western boundary of both Kansas and Nebraska." The history of this controverted group is then given, and for the benefit of the general reader a brief sketch of the evolution of the North American continent is then given in the following words:

"The continent in its present shape has been produced by the coalescence of two or more principal portions, which were elevated above the level of the sea in the earlier geographical [geological] ages in consequence of the progressive elevation of the continental area. The two principal portions of the continent previous to the Cretaceous period were an eastern and western one respectively, and before the close of that period they were separated by a broad stretch of open sea. By the continued slow rise of the whole continental area this broad stretch of open sea became land-locked at the close of the Cretaceous period and beginning of the Laramie, changing the area thus inclosed to a brackish-water sea, in which the strata that we now call the Laramie group were deposited. By the continued elevation of the continental area that sea became much reduced in size, and entirely fresh at the close of the Laramie period. During the immediately succeeding Eocene Tertiary epoch at least, the great fresh-water lakes that were thus formed prevailed over a large part of that area, which in the Laramie period had been occupied by brackish and previously by marine waters. Then began the series of movements in the earth's crust which resulted in the elevation of the plateaus and the great systems of mountains of Western North America into the structure of which these Laramie and Eocene strata enter. Some portions of the western part of the

continent continued to be occupied by fresh-water lakes of the kind last referred to during the middle and latter portions of the Tertiary period, but they were much less in size than those which previously existed. They also gradually became smaller, and finally disappeared by being drained of their waters, or remnants of them remained to become the salt-water lakes of to-day."

After a review of all the species, including the few Devonian, Carboniferous, Jurassic and Triassic, and Cretaceous species, the bulk of the review is devoted to the Laramie species. Each species is well illustrated by excellent drawings. In conclusion the author suggests, that as lakes are only parts of unfinished river systems the great western Laramie and Tertiary lakes on becoming obliterated were succeeded by rivers whose channels finally became, in part at least, the river channels of the present day. Some of the tributaries of the present Mississippi River system "are identical, at least in part, with former outlets and inlets, or both, of the great ancient lakes which have just been referred to. Consequently we may reasonably conclude also that the molluscan fauna of the Mississippi River system is lineally descended from the faunæ of those ancient lakes, and the river systems of which they constituted lacustrine portions."

Farther on he says: "The coalescence of separate minor drainage systems by the confluence of their lower portions into a common channel, during the progressive elevation of the continent, has also been an important means of the dispersion of fluvial mollusca. By such coalescence what were once separate rivers, or minor drainage systems, became parts of larger ones, as for example the union of the separate peripheral members of the great Mississippi River system, which now forms a common drainage for the principal part of the continent. The Ohio and Upper Mississippi, the two most ancient portions of the present great system, were once separate rivers emptying into a northern extension of the Great Gulf, and it is practically certain that neither of them receive that portion of the molluscan fauna which now so strongly characterizes them until after the confluence with them of the western portions of the present great river system, which brought the fauna from its ancient home in the western part of the continent." Dr. White then adds in a footnote: "These remarks are made with especial reference to the Unionidæ, but they are also applicable to other gill-bearing mollusca, and they will no doubt apply with equal force to at least a part of the ichthyic fauna of that great river system. The progenitors of the ganoids, now living in that river system, were undoubtedly landlocked in the Laramie sea, continued through the fresh-water Eocene lakes, and finally escaped to the present river system in the manner already suggested."